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MORALITY BEFORE KNOWLEDGE

The role of social communities in empowering communities through the transformation of waste into marketable products

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ABSTRACT

Background: Waste is a global issue that requires serious and sustainable handling. Waste management problems are not only the responsibility of the government or related institutions, but also a shared duty of society — including social communities. **Methods:** This research uses a qualitative method with a descriptive approach. Data collection techniques include primary sources — namely, social community administrators — and secondary sources such as necessary documentation. Data was collected through observation, interviews, and documentation from websites and social media accounts of several community organizations. The data analysis technique involved data reduction, data presentation, and drawing conclusions. **Findings:** The results of the study show that community empowerment programs have been successfully implemented, including educational initiatives such as seminars, training sessions, and city-wide clean-up campaigns, as well as the establishment of waste banks and social media awareness campaigns. The waste management methods applied by these communities include bata terawang, loseda, biopores, composting buckets, and maggot-based processing. During the implementation of these empowerment efforts, several challenges emerged, such as inadequate facilities, low public awareness of proper waste management practices, and limited financial resources in the early stages of the communities' formation. **Conclusion:** It can be concluded that the role of social communities in empowering the public through waste management has made a real contribution to reducing and transforming waste into valuable materials. **Novelty/Originality of this article:** Social communities empower people using an andragogical approach — an educational method that treats adult learners as peers. These communities have succeeded in empowering society through various channels of life, such as direct education, social media outreach, and by setting real-life examples of proper waste management.

KEYWORDS: community empowerment; waste management; social community.

1. Introduction

Waste is a global issue that requires serious and sustainable management. According to research by Lestari & Trihadiningrum (2019), improper solid waste management in Indonesia has resulted in significant plastic pollution in coastal and marine environments, which in turn affects the food chain through bivalves and fish. Marine environmental pollution will of course affect the food chain, both for animals and plants as well as humans.

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Further supporting this concern, Solehudin (2024) argues that waste imports in Indonesia are a manifestation of political ecology, shaped by political and economic factors that impact both environmental and human well-being. This is due to structural imbalances that allow the entry of foreign waste that is difficult to recycle, thus leaving the community without the capacity to deal with it. Moreover, Liu & Yang (2022) reinforce this view, highlighting that many Indonesian citizens exhibit the "Not In My Backyard" (NIMBY) syndrome—engaging in indiscriminate waste disposal. They emphasize that the primary factor in the success of waste management programs is the public's willingness to be open-minded and concerned about environmental issues. An open-minded society will strive to find solutions to address the accumulation of waste without further polluting the environment. This collective awareness will lay a crucial foundation for waste management, ensuring that waste is not immediately thrown away but sorted for recycling into useful products. In conclusion, waste management remains a critical challenge that must be addressed through appropriate and collaborative efforts, requiring awareness and active participation from all stakeholders to ensure environmental cleanliness and public health in a comprehensive manner.

Various efforts have been undertaken and numerous recommendations have been proposed by stakeholders to address waste-related issues in Indonesia. As stated in a study by Aini & Nurhutami (2022), a coordinated waste disposal flow—from households to temporary storage sites and ultimately to final disposal facilities—can help reduce waste accumulation in Indonesia and prevent adverse effects such as flooding and viral outbreaks. This assertion is supported by Zahrah et al. (2024), who emphasize the importance of a multi-stakeholder collaborative approach involving municipal governments, waste banks, and private waste collectors for achieving sustainable waste management in Indonesia. Similarly, Ferdinan et al. (2022) suggest that the Household Waste Control Index can be recommended as a tool to measure, evaluate, and inform policy recommendations aimed at promoting sustainable household waste management in Bekasi City, Indonesia. This is further reinforced by Hidayat et al. (2019), who argue that industries across Indonesia can implement sustainable waste management by adopting reverse logistics systems, returning plastic waste to the original manufacturing facilities for recycling and reuse. In addition, research by Chaudhari & Vinson (2023) highlights that waste reporting applications enable citizens to report waste accumulation, improper disposal, and other related issues in their communities, thereby enhancing waste management efficiency. In conclusion, effective waste management in Indonesia can be achieved by engaging multiple sectors and stakeholders and employing targeted waste management strategies that align with the availability of both natural and non-natural resources in each region. To strengthen the effectiveness of this strategy, integration is needed between all elements of society, including government, private sector, and the community in managing existing waste.

Despite ongoing efforts, waste-related issues in Indonesia still require focused and comprehensive attention. According to data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (KLHK), as of July 24, 2024, reports from 290 districts and municipalities across Indonesia indicated that the total volume of national waste had reached 31.9 million tons in 2023. Of this amount, 63.3%—or approximately 20.5 million tons—was managed, while the remaining 35.67%—or 11.3 million tons—remained unmanaged. The growing population in Indonesia further exacerbates the problem, as it contributes to an annual increase in waste generation. Moreover, the limited availability of land for waste processing facilities presents an additional challenge. These issues highlight the urgent need for a focused approach and collective awareness. It is essential for all stakeholders to assume shared responsibility and take an active role in minimizing and managing waste effectively. The government can provide top-down policies in the waste management system, but the community must be invited to be active in a bottom-up manner in managing their own kitchen waste.

Waste management is not solely the responsibility of the government or related institutions; rather, it is a collective duty that requires active participation from all members of society. As noted by Winarti et al. (2023), public awareness and participation in improving environmental health in Jatiendah Village, Cilengkrang Subdistrict, Bandung,

remain low, indicating a need for community empowerment to enhance outcomes. This finding is supported by research from Kubanza et al. (2022), which emphasizes that community participation in solid waste management is essential for alleviating the burden on local governments and for addressing widespread and costly waste-related problems. People can tackle the waste problem in simple ways first, such as making compost from their kitchen waste, or they can also convert plastic waste into gardening containers. Similarly, Tarigan et al. (2020) found a strong and significant relationship between public participation and waste generation levels. These findings align with the study by Phan et al. (2023), which revealed that citizen involvement in plastic waste management solutions in Vietnam is influenced by gender, education level, residential area, employment status, and awareness of plastic reduction. Therefore, it can be concluded that effective waste management requires tangible contributions from various stakeholders. In order for the public to be educated and aware of the importance of managing household waste, communities must be empowered and guided. An empowered community is capable of taking responsibility for itself and its environment, thereby fostering a cleaner and healthier living space. In addition to creating a clean and healthy environment, proper waste management will help the community's economy by selling and promoting products resulting from waste processing.

One of the key actors that can contribute to community education and guidance is the type of grassroots organization focused on empowerment and environmental issues. As highlighted in the study by Tarigan et al. (2020), community participation plays a crucial role in waste management, with program success often depending on effective collaboration between the government and local communities. This view is supported by research conducted by Souza et al. (2023), which emphasizes the significant role of social communities in waste management through their promotion of daily care practices in relation to negative externalities, the emergence of positive externalities, and the development of immaterial resources such as trust. Social communities can be the government's right hand in teaching people to adopt a clean and healthy lifestyle and manage the waste around them. Furthermore, Musiana et al. (2024) reaffirm this by stating that social communities contribute meaningfully to waste management by actively participating, integrating aspects of social justice, and utilizing technological innovations. In conclusion, the role of community-based organizations in waste management is of great importance in achieving effective and sustainable outcomes, while also fostering public awareness of the importance of maintaining a clean, healthy, and environmentally conscious living space.

Given the importance of the role played by social communities in empowering the public—particularly in relation to waste management—it is necessary to conduct a more in-depth and detailed analysis of the concrete contributions made by various community organizations that have demonstrated a positive impact on society. This research is therefore significant, as it explores the ways in which communities engage in empowerment initiatives to encourage public participation and raise awareness about the importance of managing waste properly. The aim of this study is to describe the specific programs and strategies implemented by these communities to empower individuals in reducing and managing waste as a resource with economic value. Furthermore, the research seeks to examine the approaches adopted by communities in facilitating this empowerment process, to highlight the positive outcomes that have resulted from their efforts, and to identify the challenges they face in working with the public to transform waste into valuable commodities.

2. Methods

This study employed a qualitative approach using descriptive methods, aiming to provide in-depth explanations of the events experienced by the research subjects. As explained by Gainau (2021), this descriptive method is highly suitable for qualitative research when seeking accurate and systematic facts. A descriptive method is applied to

explore the topic comprehensively. Specifically, the study seeks to examine how three social communities—World Cleanup Day Sumbar, Forum Indonesia Muda Regional Padang, and Dabaresih Dago Bandung—engage in community empowerment initiatives focused on minimizing and managing waste.

The data collection techniques in this research involve two sources of data. The primary data were obtained from the coordinators of the aforementioned communities, who are actively involved in empowering local communities in the area of waste management. Secondary data were derived from relevant documentation, including materials obtained from the communities themselves or their social media platforms. The data collection strategy was carried out in three stages: observation, interviews with representatives from each community, and document analysis through their websites or social media accounts. By using observation and interviews, data will be obtained that corresponds to actual field conditions, thus obtaining accurate data. The data analysis technique used in this study is descriptive analysis, which involves data reduction, data presentation, and conclusion drawing.

3. Results and Discussion

3.1 Result

Building upon the observations, interviews, and document analysis involving coordinators from various communities focused on environmental issues, the following descriptive findings were gathered.

3.1.1 Steps/programs taken

3.1.1.1 Educational efforts are carried out to raise local community awareness regarding the importance of reducing, sorting, and reusing waste

Several methods are used to deliver this education, including both informal and formal approaches. Informal education takes place through casual conversations and communal gatherings such as shared meals (*botram*). On the other hand, formal education is conducted through structured activities such as seminars and workshops. One common workshop involves recycling inorganic waste into handicrafts. For instance, plastic bottle caps and cups are repurposed into home decorations, such as baskets. Used cooking oil is processed into dish soap and candles. Paper waste is recycled into pulp, which is then reshaped into new sheets of paper. To support waste management, several communities organize regular programs on a weekly or monthly basis, as well as on specific commemorative days such as River Day and World Environment Day. These activities are often centered at specific locations, such as rivers, where cleanup actions are carried out.

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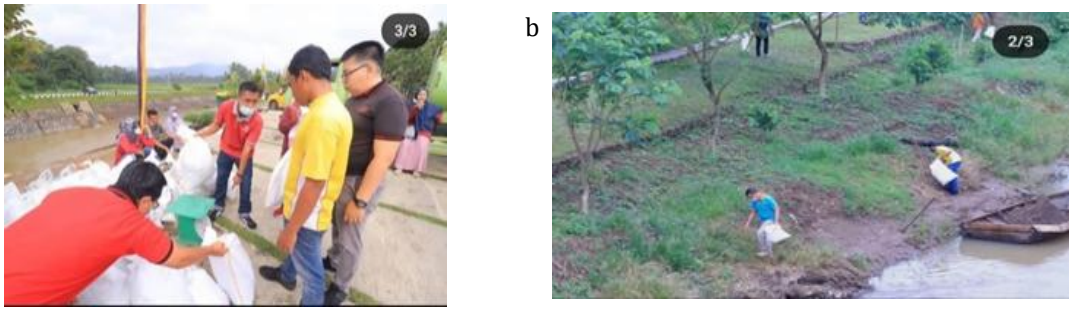

Fig. 1. (a) Waste collection along the riverbanks; (b) Waste segregation efforts in the river zone

3.1.1.2 Establishing, developing, and operating waste banks as facilities for the collection and reuse of inorganic waste

This program aims to reduce inorganic waste volumes through the establishment, development, and mobilization of community-based waste banks. Functioning as systematic hubs, waste banks facilitate the collection, sorting, and repurposing of inorganic waste—including plastics, metals, paper, and other non-organic household waste. The mechanism encourages households to segregate waste at the source and deposit it at waste banks, where transactions are recorded and exchanged for savings or economic value-based incentives. Beyond mitigating waste accumulation in landfills (TPA), the program seeks to internalize educational values and community empowerment within a framework of sustainable environmental management.

As part of program strengthening, collaborative partnerships were established with multiple stakeholders, including private enterprises, local governments, and community organizations. A particularly significant collaboration was formed with Parongpong RAW Lab, a company specializing in the collection and processing of cigarette butt waste. This waste stream warrants particular attention due to its toxic nature, non-biodegradability, and frequent exclusion from conventional waste management systems. Through this partnership, the program implemented integrated educational and operational initiatives, encompassing systematic cigarette butt collection, installation of dedicated receptacles in public spaces, and recycling processes to transform the waste into value-added products such as furniture materials or other upcycled commodities.

Program implementation sites were strategically selected based on community contexts, with primary locations including neighborhood units (Rukun Warga/RW), urban parks, and environmentally conscious cafes or businesses. This site selection strategy aimed to achieve three objectives: expanding the program's reach, raising awareness in socially active spaces, and facilitating direct interaction between communities and the waste bank system. By prioritizing high-traffic public areas and local governance structures, the approach maximized visibility and accessibility while fostering participatory engagement.

3.1.1.3 Social media education and campaigns

This program represents an educational initiative designed to enhance youth awareness regarding marine debris issues, particularly in the coastal areas of Padang City. The program's primary focus involves disseminating information and promoting behavioral change through digital campaigns across various social media platforms. Educational content is delivered through engaging visual formats, including photographs, infographics, and short videos that convey critical messages about the impacts of marine debris on coastal ecosystems, along with concrete mitigation measures. These materials are intentionally designed to be both accessible and relevant to the daily lives of the target demographic—digitally active youth. Through this approach, the program seeks to cultivate early ecological awareness and foster active youth participation in marine conservation efforts.

Beyond passive educational content, the program facilitates public interaction and participation through online challenges, hashtag campaigns (#), and invitations to share best practices in reducing plastic waste within local communities. By leveraging the extensive reach of social media networks, the initiative aims to generate positive viral effects while establishing a sustainable digital advocacy network among Padang's coastal youth. This strategy aligns with contemporary environmental communication frameworks that emphasize participatory digital engagement as a catalyst for grassroots behavioral change. The program's dual emphasis on knowledge dissemination and interactive participation reflects an innovative approach to addressing marine pollution through youth-driven digital activism.

3.1.1.4 The waste plogging program

Includes cleanup activities and serves as an annual global initiative, held simultaneously across the world and throughout Indonesia. It takes place in September and represents the peak event of the global cleanup movement. In West Sumatra Province, the program is implemented at multiple locations, including the cities of Padang, Bukittinggi, Payakumbuh, and the regencies of Sijunjung and Padang Pariaman, among other designated gathering points for the cleanup action. During this event, volunteers, community organizers, relevant stakeholders, and members of the public work collectively to collect waste in a coordinated effort.

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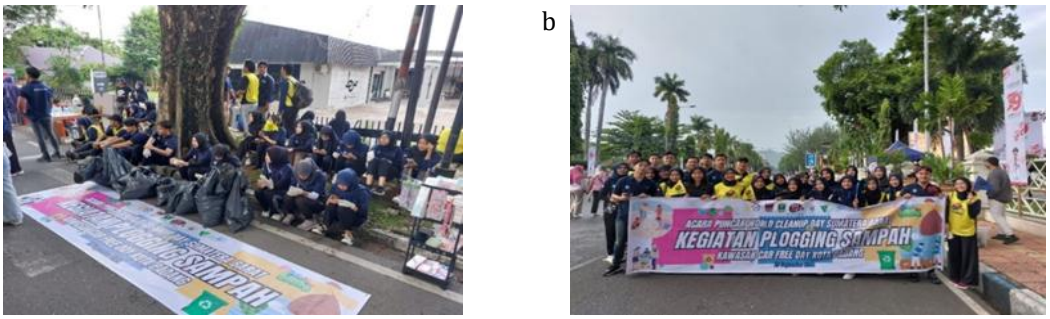

Fig. 2. (a) and (b) Waste plogging activity in Padang City
(Komunitas World Cleanup Day Sumbar, 2024)

3.1.1.5 Collaborative or independent programs

Collaborative or independent programs have been carried out with various stakeholders, such as Bank Indonesia. One example is a mangrove planting initiative in Padang Pariaman Regency, a region characterized by an extensive coastline, making it an ideal location for mangrove reforestation. Another initiative is the Car Free Day program in Padang City, which involves waste collection activities with designated gathering points at the Mayor's Office and Padang Beach. This event incorporates a reward-based system in which participants who collect the most waste are recognized with prizes sponsored by event donors, such as Bank Indonesia. These collaborative efforts significantly support community organizers in executing environmental initiatives and contribute to strengthening volunteer engagement by providing recognition and appreciation for their contributions. Direct education is provided to the community on how to properly sort and manage organic waste, inorganic waste, and hazardous and toxic waste (B3). One example of such educational activity is the composting workshop held at the basecamp of Forum Indonesia Muda Regional Padang.

3.1.1.6 The funwalk peduli sampah

Waste Awareness Fun Walk event aimed to disseminate information and education on environmental awareness (KIE) through a community walk, which started from the West Sumatra Governor's Office. The event was officially launched by the West Sumatra Provincial Environmental Agency and other relevant government departments, with more than 80 participants in attendance. Participants walked while carrying posters featuring QR codes linked to waste-conscious lifestyle campaigns. As part of the activity, organizers also distributed 50 reusable tote bags to promote the reduction of single-use plastic bags. The educational approach involved direct engagement with members of the public who were observed carrying single-use plastic bags while shopping. Organizers provided brief educational interactions and replaced the plastic bags with reusable shopping bags. The event also included public speeches (orations) emphasizing the importance of adopting a waste-conscious lifestyle.

Fig. 3. Group photo of all participants who joined the Waste Awareness Funwalk (Komunitas World Cleanup Day Sumbar, 2024)

The event also featured educational booths organized by three waste banks and various environmental communities participating in the 2025 National Waste Awareness Day celebration, alongside several stakeholders and sponsors such as Pegadaian and Semen Padang. These booths provided visitors with the opportunity to engage directly with environmental practitioners and gain practical knowledge on proper waste management.

3.1.1.7 Direct community education on organic, inorganic, and hazardous waste (B3) segregation and management, as exemplified by composting education activities at Forum Indonesia Muda Regional Padang headquarter

This waste management education program was designed to enhance community knowledge and skills in proper waste segregation and management, focusing on three main categories: organic waste, inorganic waste, and hazardous and toxic materials (B3 waste). The education was delivered directly through community meetings, practical training sessions, and demonstrative activities that enabled active public participation. The primary objectives of this program were to develop ecological awareness and technical capacity among residents in implementing sustainable waste management principles at the source, both in household environments and public spaces. Organic waste, including food scraps and leaves, was introduced as materials that can be processed into compost through simple and environmentally friendly methods. A key program implementation was composting education conducted at Beskem Forum Indonesia Muda (FIM) Regional Padang. This activity provided participants with theoretical understanding of the decomposition process and compost benefits for urban agriculture or green space utilization, coupled with practical training in creating compost using both aerobic and anaerobic methods with household materials. The education aimed to reduce organic waste volumes sent to landfills while maximizing waste potential as a resource.

For inorganic waste, the education emphasized sorting practices by material type (plastics, paper, metal, glass) and proper storage methods prior to recycling or distribution to waste banks. Communities were introduced to systems converting inorganic waste into economic value through waste savings schemes or community-based incentive programs. Meanwhile, hazardous and toxic waste (B3) management - including used batteries, fluorescent lamps, pesticide containers, and small electronic products - received specialized attention highlighting their health and environmental risks. The education covered B3 waste identification, safe storage practices, and distribution channels to authorized processing facilities or designated collection points in collaboration with relevant agencies. Through its face-to-face, community-based, and practice-oriented approach, the program sought to cultivate holistic understanding and new habits in more responsible waste management. Furthermore, such activities created platforms for inter-community discussion and collaboration, strengthening local environmental action networks. This

education model demonstrates replicability potential for other regions as part of a more effective and sustainable decentralized waste management strategy.

At the booth hosted by the Forum Indonesia Muda Regional Padang community, a composting unit was displayed to demonstrate how households can produce their own compost. Additionally, educational materials on *Eco-Enzyme*—a method of converting organic waste from fruits and vegetables into beneficial liquid products—were provided. The *Gerai Prabumi* booth showcased creative and sustainable products designed to replace single-use items. These included items such as aromatherapy candles made from recycled used cooking oil, illustrating practical ways to reduce environmental harm.

Another key feature of the event was a literacy corner aimed at children attending the *Funwalk Peduli Sampah*. Organizers conducted live read-aloud sessions of a children's book titled *Rumah Ramah Bumi* (Eco-Friendly House), which contains engaging illustrations promoting environmentally responsible behavior, such as reducing plastic waste. The book encourages children to take responsibility for their own waste, in line with the event's tagline: *"Your Waste, Your Responsibility."* These simple yet meaningful actions aim to cultivate environmentally conscious attitudes from an early age. Furthermore, waste banks conducted educational sessions on the importance of managing waste from home. To enhance public engagement, door prizes were offered to active participants. The event also featured a Sustain Market, where the Gerai Prabumi team promoted and sold upcycled and handcrafted products made from recycled waste in collaboration with affiliated waste banks.

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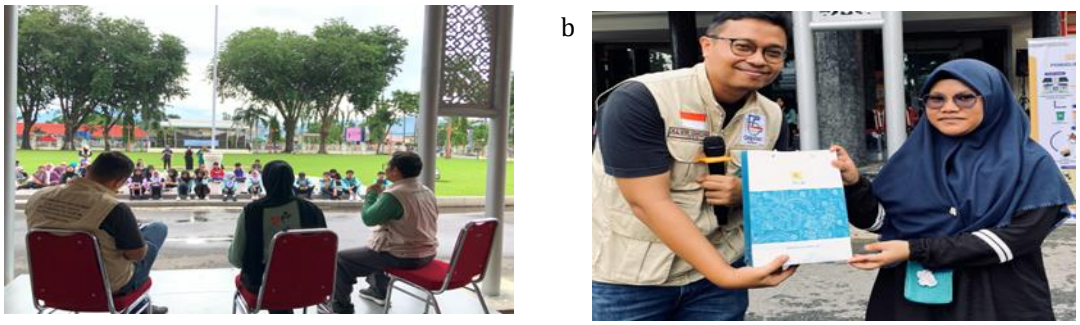

Fig. 4. (a) Waste bank education for visitors; (b) Doorprice handover for active participants during the activity
(Komunitas World Cleanup Day Sumbar, 2024)

3.1.2 Approaches to empowerment

Each community empowerment initiative employed different approaches, tailored to the specific characteristics of each region, including the local population's educational background and socioeconomic status. For example, communities with predominantly small business owners or street vendors were more responsive to economically framed education. In such cases, waste was exchanged for money. Under this scheme, residents deposited sorted waste at waste banks, where it was converted into monetary value. The collected waste was then sold to larger aggregators or central waste banks, which in turn sold it to recycling factories or industries. These industries processed the waste into plastic pellets, which could then be used to manufacture new products, such as buckets or dippers. This model aligns with the principles of the circular economy, which emphasizes reducing, reusing, and recycling resources, as well as recovering energy from waste.

Circular economy practices in waste management promote more efficient and sustainable resource use through recycling and waste reduction. Despite challenges such as logistics costs, regulatory barriers, and technological integration, the model offers significant opportunities, including environmental impact reduction, job creation, and strengthened collaboration among stakeholders.

In communities with higher levels of education, environmental and health issues served as more effective entry points for education. However, the most impactful method

overall was role modeling—where waste bank organizers not only educated and encouraged residents to sort and deposit waste but also demonstrated these behaviors in their own daily lives. Other effective approaches included guidance-oriented methods, which emphasized mentoring rather than commanding, in recognition of the community's diverse cultural and behavioral characteristics. This required organizers to exercise flexibility and cultural sensitivity in delivering education.

Moreover, community engagement was strengthened by involving residents directly in programs, thereby fostering a sense of ownership and recognition. Collaboration with multiple stakeholders was also key. These included the environmental agency, the communications and information agency (Kominfo), local government officials such as mayors and regents, the tourism department, and schools in Padang City, which were encouraged to send ten student representatives each. Local environmental communities based in cleanup locations were also engaged, along with youth and students from the area, to ensure that environmental actions were inclusive and involved multiple societal sectors.

Various community organizations have made efforts to educate the public to encourage and enable waste sorting at the source—namely, from individual households. Waste is generally separated into at least three categories: organic, inorganic, and residual. Organic waste is managed by the community or organizing committees using several different methods. One such method is the *Terawang brick technique*, which involves incorporating organic waste into the production of bricks as a partial substitute for clay. This approach aims to reduce the environmental impact of the construction industry by repurposing organic materials. Another method is *Loseda*, which focuses on replacing mineral fertilizers and minimizing phosphorus loss to mitigate environmental issues such as eutrophication and resource depletion. The biopore method involves creating infiltration holes that allow for water absorption and the decomposition of organic waste into compost. This technique is especially effective in densely populated urban areas, such as Bandung, where waterlogging and waste accumulation are significant concerns. The bucket composter method is another household-level strategy that transforms organic waste, particularly food scraps, into liquid organic fertilizer. This technique typically uses stacked buckets to facilitate the decomposition process. Additionally, the *maggot method*—specifically using Black Soldier Fly (BSF) larvae—utilizes the larvae's capacity to break down organic materials. This approach not only significantly reduces the volume of organic waste but also creates economic value by producing usable by-products such as animal feed and compost.

The implementation of the aforementioned methods is highly dependent on the availability of land, tools, and human resources in each respective area. Inorganic waste is sorted based on its type or material, and when categorized in detail, it can be classified into as many as 30 different types. This sorted inorganic waste is then either deposited or sold to a central waste bank or local collectors. As for residual waste—such as cigarette butts—these can be sent to Parongpong RAW Lab for further processing. Other types of residual waste, however, typically end up in landfills. This category, which includes items like tissue paper, single-use cotton pads, sanitary pads, and baby diapers, needs to be significantly reduced due to its persistent environmental impact.

3.1.3 Positive impact of community empowerment through waste management

The positive impacts of community-based waste management initiatives can be observed across various stakeholders. For community organizers, these activities provide a platform for self-actualization and tangible contributions to public life. When managed effectively, such initiatives also offer the potential to generate income, making them both socially meaningful and economically beneficial. For local residents, the initiatives help reduce the risk of disease and environmental pollution while offering the opportunity to earn additional income by depositing sorted waste at community waste banks, where it is converted into monetary value. When aligned with appropriate local government regulations, these practices can significantly reduce transportation costs associated with waste disposal at final landfill sites. Additionally, the public becomes more aware that waste

management is a shared responsibility, not solely that of the government. Communities begin to understand the importance of separating waste at the source, recognizing that each type of waste requires different treatment methods. People also gain knowledge of simple household waste management practices and begin to see global cleanup efforts as a reminder that waste poses a significant environmental threat requiring collective action. These activities raise awareness that waste is a shared burden extending beyond local boundaries to a global scale.

The presence of waste management activists or communities provides significant positive impacts for local governments in terms of environmental management and public services. Strategically, this community involvement can be viewed as a form of active public participation supporting government policies in waste reduction at the source. Citizen-driven initiatives such as waste banks, recycling programs, and environmental education not only create cleaner and healthier environments but also serve as indicators of government success and achievements across administrative levels, from Neighborhood Associations (RT/RW) to sub-district and district levels. These accomplishments may be reflected in improved environmental cleanliness indices, Adipura program achievements, or recognition through various environmental awards.

Additional Positive Impacts; One notable subsequent impact of community-based waste management programs is the growth of micro, small, and medium enterprises (MSMEs) adopting sustainability principles, particularly in producing eco-friendly and low-waste products. These MSMEs serve not only as vehicles for local economic empowerment but also as change agents promoting sustainable lifestyles. Their products typically utilize recycled materials, household waste, or renewable local resources - including patchwork fabric bags, natural food packaging, upcycled wooden furniture, and other creative products emphasizing utility, aesthetics, and sustainability.

The growth of environmentally-oriented MSMEs directly contributes to waste reduction efforts while stimulating emerging markets with greater ecological consumption awareness. Furthermore, these enterprises play crucial roles in establishing new circular economy value chains where waste is no longer considered residue but rather potential reusable resources. Within this context, MSME strengthening becomes integral to waste management systems that incorporate not only waste handling but also socioeconomic transformation. Therefore, supporting green MSME development represents a vital strategy for sustainably integrating environmental and economic aspects in local and national development policies. Additional benefits include the growth of environmentally conscious micro, small, and medium enterprises (MSMEs) that produce low-waste, sustainable local products, supporting a broader shift toward a zero-waste lifestyle. Furthermore, areas that serve as focal points for global cleanup actions become cleaner and better maintained, thereby enhancing the overall well-being and comfort of local communities.

Improved Cleanliness in World Cleanup Day Target Areas; implementation of cleanup campaigns like World Cleanup Day directly improves environmental cleanliness and quality in target areas. These activities demonstrably reduce accumulated waste in public spaces including roads, beaches, urban parks, and residential areas. Participating locations show measurable environmental quality improvements through decreased illegal waste dumping, enhanced aesthetic value, and healthier, more comfortable public spaces. Large-scale synchronized cleanups also function as environmental revitalization efforts that routine waste management often overlooks.

The benefits extend beyond ecological impacts to social dimensions. Cleaner environments enhance community comfort and quality of life while strengthening collective ownership and responsibility for shared spaces. Moreover, mass cleanup events raise public awareness about sustainable environmental maintenance and may inspire similar local initiatives. In this context, cleanups transcend symbolic value by delivering practical impacts on environmental governance and cultivating community cleanliness cultures. Thus, such programs constitute effective environmental intervention strategies with comprehensive physical, social, and psychological benefits for communities.

3.1.4 Challenges in community empowerment through waste management

One of the major challenges faced, especially during the early stages of establishing a community, is funding. Many newly formed communities struggle to apply for and secure sponsorships due to limited public recognition and a lack of ongoing programs. However, without adequate funding, programs cannot proceed. Although these communities do not require large amounts of capital, they do need consistent funding—for instance, to purchase gloves, trash bags, and refreshments for volunteers participating in clean-up efforts. Additionally, when collected waste cannot be processed locally, transportation is required to haul it to final disposal sites, which further increases costs. As a result, organizers often end up supporting each other financially to ensure the continuity of clean-up initiatives.

Another major challenge is educating the public to reduce, separate, and reuse waste. Ironically, the hardest people to convince are often those closest to the organizers—their own family and friends. Gaining support from neighborhood leaders such as RTs (neighborhood heads), RWs (community heads), and subdistrict administrations also requires considerable effort. Many communities initially face difficulties in forming partnerships or collaborations because newly established groups are not yet trusted by external stakeholders. Over time, as these communities demonstrate consistent, impactful programs, stakeholders gradually develop trust, which in turn helps stabilize their financial condition.

Leadership involvement at the neighborhood level also varies. In some areas, RT or RW leaders are directly engaged in managing organic and inorganic waste, serving as role models for their communities. However, in other areas, local leaders are passive, leaving all responsibilities to the volunteers. This disparity highlights the need for intrinsic motivation and collective responsibility to achieve a clean, well-maintained environment.

Infrastructure limitations are another pressing issue. Certain areas still lack designated spaces for waste processing. In some cases, waste banks operate out of narrow alleys or borrow school property for temporary use. These arrangements are often unstable—for example, when the borrowed space is reclaimed for school expansion, waste bank operations must relocate. Weather is also an obstacle, with volunteers having to work under scorching sun or cope with flooding that affects facilities such as maggot farms.

Within the internal dynamics of a community, it takes strategy and effort to foster strong intergenerational cooperation. Outgoing leaders must pass on their knowledge and support to the newly appointed coordinators. Experienced leaders, with their history of successful initiatives, are generally more adept at planning and executing effective actions. In contrast, new leaders need a greater willingness to learn and a strong sense of responsibility to fulfill their roles effectively and uphold the mission of the organization.

3.2 Discussion

Waste remains a significant issue that continues to require collective attention from various sectors and levels of society. Improperly managed waste can negatively impact numerous aspects of life, such as creating polluted environments, reducing air quality and causing respiratory issues, and increasing the spread of diseases due to unsanitary conditions. Therefore, the involvement of all stakeholders is essential. One key contributor is community-based organizations focused on environmental awareness. These groups play a crucial role in empowering society to take responsibility for waste management. Social communities are instrumental in encouraging active participation, building social capital, and educating the public on sustainable waste practices. Collaboration among various stakeholders—including women and youth—can strengthen these efforts and lead to more sustainable solutions to waste problems. This aligns with research by Brotosusilo et al. (2021), which found that community empowerment can help address the complexities of waste management by increasing individual involvement in social activities such as local meetings, village rehabilitation, youth group programs, religious events, and family welfare training sessions.

As supported by previous research, sorting and managing waste according to its type is one of the key steps toward achieving a healthy environment. To educate the public effectively, educational strategies such as seminars, workshops, and hands-on training can raise awareness about the importance of maintaining environmental cleanliness through proper waste management practices. The model of socialization in waste management involves participation, behavioral change, and collaboration to enhance community awareness and motivation in waste handling (Hermawati et al., 2023). Additionally, training programs focused on household waste management and promoting the economic benefits of waste processing have been shown to increase community participation. Community partnership programs aim to foster environmental awareness and empower residents by providing education, guidance, and evaluation on how to turn household waste and used cooking oil into various handicraft products (Putra et al., 2022). In conclusion, educational strategies such as seminars and waste management training can help raise public awareness and understanding of proper waste handling. Direct community involvement plays a critical role in boosting participation in waste sorting and processing efforts.

In addition, the presence of active waste banks in every sub-district and village can significantly help address waste-related issues. Communities collaborate with waste bank administrators to jointly sort and process waste into items with economic value. Moreover, this initiative can improve the local economy as waste can be exchanged for money. This aligns with the findings of Purwendah & Wahyono (2022), which state that the Waste Bank program can reduce the high volume of waste in communities while increasing household income by allowing residents to exchange waste for money deposited into their accounts. The program also enhances waste bank management by supporting human resource development, implementing digital management systems, and expanding the range of recyclable products (Utomo et al., 2024). Furthermore, waste banks provide economic incentives for communities to recycle and manage waste effectively, contributing to sustainable waste management and environmental preservation (Marlina et al., 2023). In conclusion, the presence of active waste banks has a positive impact on maintaining environmental cleanliness and improving the economic conditions of housewives. Therefore, such initiatives should be continued and expanded to increase the number of waste banks benefiting communities.

Clean-up programs, especially in urban areas or following natural disasters, play a crucial role in restoring polluted environments. These initiatives aim to reduce environmental impacts and improve the efficiency of waste management. Citywide mass clean-up efforts represent an important initiative in sustainable waste management and in enhancing urban cleanliness. These programs involve various stakeholders, including government agencies, the public, and non-governmental organizations, to create cleaner and healthier living environments.

Aligned with this, research by Rangeti & Dzwairo (2021) found that community-led clean-up campaigns can effectively remove illegal dumping sites, raise awareness about the consequences of waste disposal, and foster a sense of unity among local residents. Social communities also play a vital role in encouraging public participation in these clean-up efforts. As Rangeti & Dzwairo (2021) emphasized, clean-up campaigns led by local communities can heighten awareness of the negative impacts of littering and help build stronger community bonds. Experience has shown that such campaigns not only clean the environment but also motivate residents to engage in sustainable waste management practices. In conclusion, citywide clean-up programs require collaboration among governments, citizens, and organizations to be successful. Public awareness and the support of municipal authorities are essential to promote sustainable waste management practices and improve urban cleanliness. When implemented effectively, these programs can enhance the quality of life and create a healthier environment for all residents.

In addition to citywide clean-up campaigns, social media campaigns focusing on environmental cleanliness and household waste management also play a crucial role in maintaining a healthy environment. In line with this, a study by Ardianti et al. (2022) found that the Instagram environmental campaign *KangPisMan* received positive responses and

demonstrated that engaging campaign messages with well-structured content significantly influenced followers' waste management attitudes. Similarly, Alifia et al. (2023) reported that the presentation and delivery of information by @waste4change on Instagram significantly affected users' attitudes toward waste management. Supporting these findings, Jiang et al. (2021) noted that user engagement with household waste management content on social media peaks between 12:00–1:30 PM and 9:00–10:00 PM on Thursdays.

In conclusion, social media campaigns on waste management can serve as a powerful tool to raise awareness and influence public behavior. With the right strategies—such as leveraging influencers, creating engaging content, utilizing a community-based approach, and posting at optimal times—these campaigns can contribute to more effective and sustainable waste management practices. However, further research is needed to better understand their long-term impact and to optimize their effectiveness.

Empowering communities through waste management by transforming waste into marketable goods requires the use of well-targeted strategies and methods to ensure program success. As stated by Bobulski & Kubanek (2021), deep learning can effectively sort plastic waste into four categories, improving recycling efficiency and reducing urban waste problems. The biopore method is effective in processing organic waste into compost, enhancing soil water infiltration, and reducing waterlogging. It can also be easily applied in various environments. At the Christian University of Technology in Solo, the biopore method produced 1.48 kg of compost from dry leaves and 1.3 kg from kitchen waste within 30 days (Lolo et al., 2023).

Additionally, the composter bucket method is effective in separating waste. A solar-powered biodegradable waste sorter and composter can efficiently distinguish between degradable and non-degradable waste, enabling the production of clean, pollution-free agricultural fertilizer (Borole et al., 2023). Furthermore, immediate feedback in digital sorting games improves the accuracy of recycling and composting, leading to increased compost material weight and reduced contamination rates (Luo et al., 2019). The maggot method, which uses Black Soldier Fly (BSF) larvae to convert organic waste into high-value biomass, also enhances public understanding of efficient waste processing (Sari et al., 2024). In conclusion, there are several methods available for sorting and processing waste, each with its own advantages. The selection of method depends on the availability of supporting infrastructure and facilities in the local context.

Implementing community empowerment programs among people with diverse cultural and social backgrounds inevitably presents unique challenges for facilitators during the execution of such initiatives. These challenges range from financial constraints, lack of support from various stakeholders, to internal issues within the community itself, such as the need to build stronger interpersonal connections among members. In line with this, Sukoco et al. (2024) noted that low community participation in waste management is a significant challenge, although there is economic value in the recycled products generated by community members. Arini (2024) further stated that the main obstacles in empowering communities through waste management include a lack of public understanding, inadequate infrastructure, and poor coordination.

Despite facing various challenges in the field, community leaders remain highly motivated to continue educating the public. This strong commitment has led to positive outcomes in multiple areas—improvements in environmental cleanliness, enhanced household income through waste-for-cash exchanges, and benefits for local governments. Supporting this, Burhanuddin (2024) asserted that community empowerment projects and social entrepreneurship play an important and beneficial role in advancing sustainable waste management practices in Indonesia. The Gade Clean and Gold program at the Waste Bank has significantly impacted communities in economic, environmental, and social dimensions (Cahyadi et al., 2023). Similarly, research by Souza et al. (2023) found that the Zero Waste Nucleus in Belo Horizonte, Brazil, successfully addressed NIMBY effects and increased citizen participation in community-based solid waste management by fostering daily care for negative externalities, promoting positive externalities, and building public trust. In conclusion, empowering communities through waste management has

demonstrated meaningful positive impacts—from improved environmental hygiene and additional income to enhanced public health and well-being.

4. Conclusions

The role of social communities in empowering society through waste management has made a significant contribution to reducing and transforming waste into valuable products. This is achieved through various programs such as public education via seminars, workshops, and training sessions on processing organic, non-organic, and residual waste. Other initiatives include city-wide clean-up events, river clean-ups, and social media campaigns aimed at raising awareness among Indonesian youth about the importance of environmental cleanliness.

To support waste sorting efforts, several methods are used, including bata terawang, loseda, biopores, composting buckets, and maggot-based composting. Naturally, community empowerment efforts also face certain challenges, such as limited facilities, low public awareness regarding proper waste management, and insufficient funding—especially during the early stages of these social community groups. However, despite these challenges, community empowerment programs through waste management have successfully generated positive impacts across multiple aspects of life. These include benefits for community organizers, the wider public, and the environment—resulting in cleaner, healthier, and more sustainable living conditions.

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